CLAIMS:

1. Gas turbomachinery electricity generation apparatus comprising:

a gas turbomachinery arrangement;

a rotary drive take-off associated with the gas turbomachinery arrangement;

an electricity generating arrangement comprising:

i) a first generator stage including a first generator rotor and generator stator arrangement; and,

ii) a second generator stage including a second generator rotor and generator stator arrangement;

wherein at least one of the first and second generator stage rotors is driven by the rotary drive take-off.

2. Apparatus according to claim 1, wherein the gas turbomachinery arrangement includes a gas driven turbine stage or stages.

3. Apparatus according to claim 2, wherein the rotary drive take-off is associated with the gas driven turbine stage.

4. Apparatus according to claim 1, wherein the turbomachinery arrangement includes a gas compressor stage.

5. Apparatus according to claim 4, wherein the turbomachinery arrangement includes a rotary compressor stage including a rotary impeller stage.

6. Apparatus according to claim 1, wherein the first and second stage generator rotors are driven by the turbomachinery arrangement.

7. Apparatus according to claim 1, wherein the turbomachinery arrangement includes a gas compressor stage having a rotary impeller, the turbomachinery arrangement including a gas turbine stage, the compressor impeller and turbine rotor being mounted on a common shaft.

8. Apparatus according to claim 7, wherein the first and second rotor stages of the electricity generation arrangement being directly driven by the common shaft.

9. Apparatus according to claim 8, wherein the first and second rotor stages of the electricity generation arrangement are arranged in series.

10. Apparatus according to claim 8, wherein the first and second rotor stages of the electricity generation arrangement are mounted on a common shaft.

11. Apparatus according to claim 8, wherein the first and second rotor stages of the electricity generation arrangement are mounted on the common shaft of the turbine rotor and compressor impeller.

12. Apparatus according to claim 1, wherein the turbomachinery arrangement includes a gas compressor stage having a rotary impeller, the turbomachinery arrangement including a gas turbine stage, the first and second rotor stages of the electricity generation arrangement being mounted upon separate shafts.

13. Apparatus according to claim 12, wherein the first and second rotor stages of the generation arrangement are drivingly associated with one or other of the compressor impeller and the (or a) turbine rotor.

14. Apparatus according to claim 12, wherein the shafts may be coupled by gear means or clutch means.

15. Apparatus according to claim 1, wherein the gas turbomachinery arrangement includes a gas driven turbine stage or stages, and the turbomachinery arrangement includes a gas compressor stage, the gas compressor stage being mounted on or connected to a take-off shaft of the turbine stage.

16. Apparatus according to claim 1, wherein the turbomachinery arrangement includes a combustion stage for combustion of a gas/fuel mixture.

17. Apparatus according to claim 16, wherein the combustion stage is provided intermediate the compressor stage and the turbine stage.

18. Apparatus according to claim 16, wherein the gas turbomachinery arrangement is arranged to burn a gas fuel or a liquid fuel at the combustion stage.

19. Apparatus according to claim 16, wherein the combustion stage comprises a combustion chamber in which a working gas is heated by combustion of the fuel, which is then passed to a downstream turbine.

20. Apparatus according to claim 1, wherein one of the first and second generator stages is more highly power rated than the other.

21. Apparatus according to claim 20, wherein the power rating ratio between the two stages is substantially in the range 1:1.5 to 1:9.

22. Apparatus according to claim 21, wherein the power rating ratio between the two generator stages is substantially in the range 1:2 to 1:4.

23. Apparatus according to claim 1, wherein one or both of the generator rotors are arranged to be driven to initiate rotational operation of the turbomachinery arrangement.

24. Apparatus according to claim 1, including means for operating at least one of the generator stages in motor mode.

25. Apparatus according to claim 24 including control system means for operating at least one of the generator stages in motor mode.

26. Apparatus according to claim 25, wherein the control system includes inverter means for power supply to the or each generator stage.

27. Apparatus according to claim 26, wherein the inverter means is arranged to charge/maintain a start-up power supply battery.

28. Apparatus according to claim 24, wherein the lower power rated stage rotor is arranged to be driven to initiate rotational operation of the turbomachinery arrangement.

29. Apparatus according to claim 25, wherein the apparatus control system is capable of selecting electrical power to be supplied by one or other or both of the first and second generator stages dependent upon the output requirement of the apparatus.

30. Apparatus according to claim 18, wherein the gas turbomachinery arrangement includes a gas driven turbine stage or stages and the turbomachinery

arrangement includes a gas compressor stage, the apparatus including recuperator means for preheating the air by heat from the exhaust of the gas turbine before the air passes to the combustion chamber or chambers.

31. Apparatus according to claim 1, wherein a compressor and a turbine stage of the turbomachinery arrangement and the rotors of the first and second generating stages are coupled together on a common axis to form a single line.

32. Apparatus according to claim 31, wherein the line includes means such as a spline or a gear coupling to permit the axial length of the line adjusting itself automatically to the demands of differential expansion between the line and stationary parts.

33. Apparatus according to claim 1, comprising the gas turbomachinery arrangement includes a gas driven turbine stage or stages and the turbomachinery arrangement includes a gas compressor stage, a turbine stage and a rotor of one of the electricity generator stages coupled together on a common axis on a first line, and on a second line on a common axis the rotor of the second electricity generator stage coupled together with a turbine stage driven by an appropriate fraction of products of combustion taken from the turbomachinery arrangement of the first line.

34. Apparatus according to claim 1, wherein a respective rotor of the generator arrangement includes an airway extending generally in the direction of the rotor axis permitting cooling air or other gas to be drawn along the rotor.

35. A rotor of an electric generator or motor, the rotor including an airway extending generally in the direction of the rotor axis permitting cooling air or other gas to be drawn along the rotor.

36. A rotor according to claim 35, wherein the airway extends adjacent the outer surface of the rotor.

37. A rotor according to claim 35, wherein the airway has an inlet portion proximate an end of the rotor.

38. A rotor according to claim 35, wherein a shroud portion overhangs the end of the rotor, defining an air gap between the rotor end and the shroud.

39. A rotor according to claim 38, wherein the shroud portion overhangs the airway inlet.

40. A rotor according to claim 35, further comprising an airway outlet to permit the cooling air to vent from the rotor at a position spaced longitudinally from the inlet.

41. A rotor according to claim 35, wherein the rotor comprises a permanent magnet armature having one or more permanent magnets positioned at the radial periphery of the rotor body.

42. A rotor according to claim 41, wherein the airway extends along the rotor intermediate the permanent magnet and the rotor body.

43. A rotor according to claim 41, wherein a securing rim or annulus extends around the magnet armature.

44. A rotor according to claim 35, wherein the magnet armature is seated in a seat formed on the rotor body.